Amateur Radio Today

...two views

Popular Mechanics February, 1976

How to tune in ham radio's space station

spectrum October, 1975

Inside amateur radio

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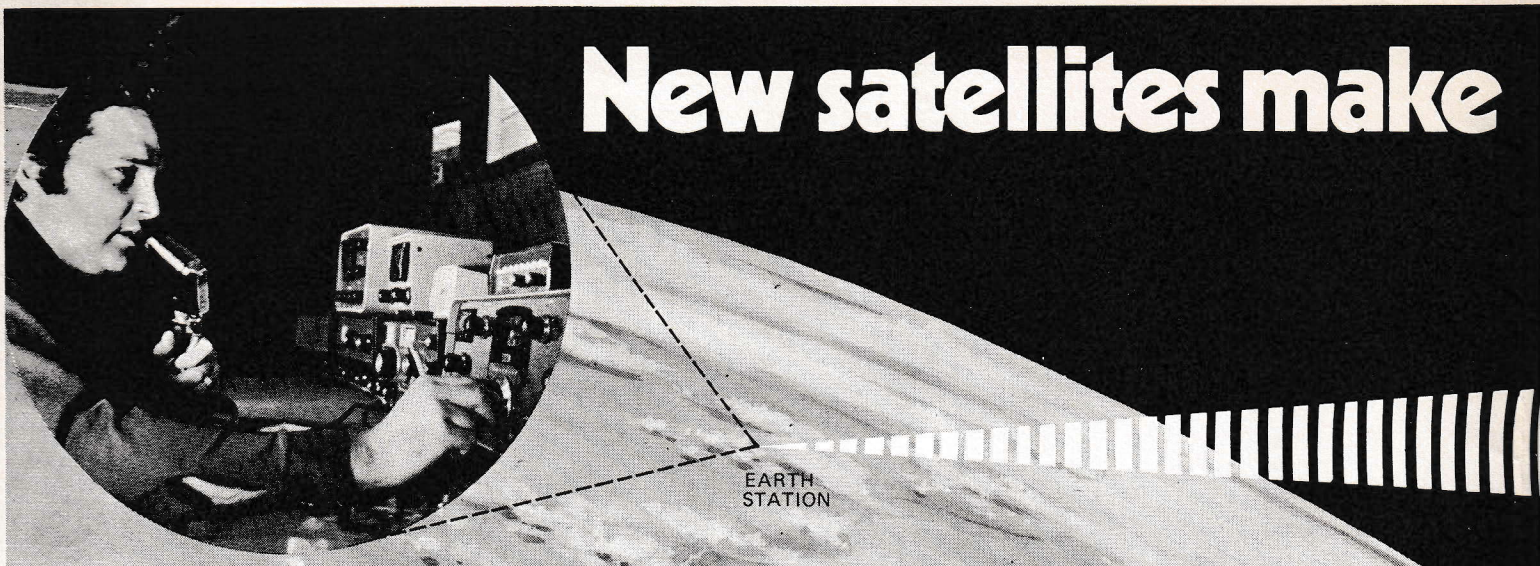
225 Main Street, Newington, Ct. 06111

New satellites make



Dr. Peter Penham, one of Africa's flying doctors working out of a little village on the northern slope of Mount Kilimanjaro, Kenya, has been bitten by the OSCAR bug. Somebody gave Pete an old radiotelephone, a vacuum tube and some coaxial cable. The doctor added some empty aspirin tins and a quartz crystal from his airplane radio. Right out there in the African bush he fired up a home-brew transmitter built on the aspirin tins and talked to the world through OSCAR—the Orbital Satellite Carrying Amateur Radio.

The excitement gripping Pete as he built the transmitter reached fever pitch as he sent a signal up to a satellite 900 miles overhead and heard his call letters, 5Z4JJ, coming back down to his receiver. His very first chat with another ham radio operator, through the satellite, was with amateur station 4W1ED, more than 1000 land miles away in Yemen.

Since his contact last year with Yemen, Pete has communicated with amateur radio operators in 18 different countries on three continents. Meanwhile, Suby, operator of ham station VU2UV in southern India, has been talking with hams in Finland, Rhodesia, Poland, Germany, Japan and the USSR via the satellite. Dick Cotton, owner of station W8DX in Detroit has used OSCAR to talk with hams in 51 different countries on five continents.

Vic Politi, W1NU of Fairfield, Conn., is an amateur bulletin station, broadcasting news about OSCAR through OSCAR to anybody interested. Bud Schultz, W6CG of Anaheim, Calif., has earned an award for contacting other ham operators in each of the 50 states through the satellites.

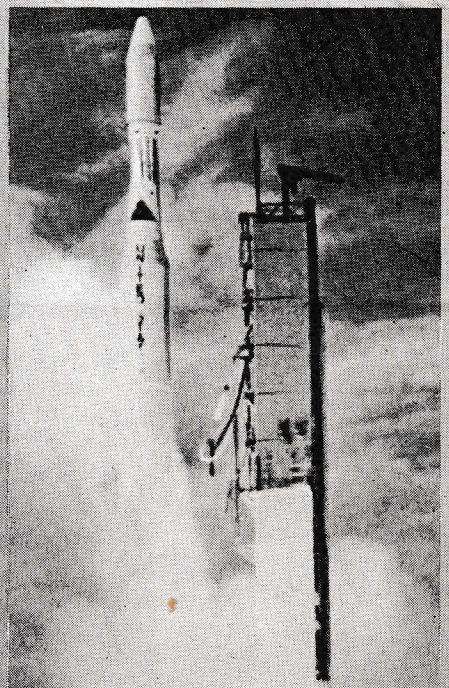
Thousands are using OSCAR

OSCAR satellites are the hottest news in ham radio. The hobby, which started radio broadcasting and point-to-point communications at the turn of this century, is in the grip of OSCAR fever. Thousands of hams in nearly every nation of the world are geared up and riding along electronically every day on two satellites they designed, built and financed. Many more are preparing for the ride.

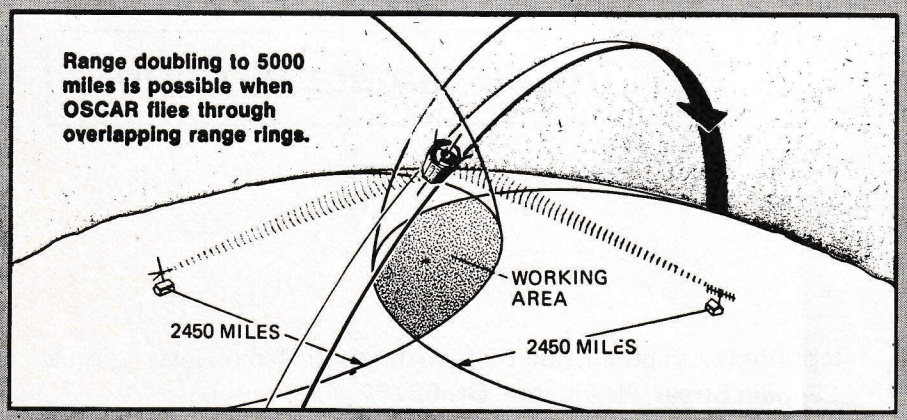
There have been seven OSCAR satellites in orbit. All have gone into orbit as piggyback riders on rockets blasting government satellites into space. The National Aeronautics and Space Administration (NASA) uses OSCARs instead of deadweight ballast to further public education in space science. Two ham satellites, OSCAR 6 and OSCAR 7, remain up there today, circling the globe in 900-mile-high polar orbits every couple of hours. OSCAR 6 was launched in 1972 alongside an ITCS weather satellite. OSCAR 7 rode aloft in 1974 with the NOAA 4 weather satellite and the Spanish INTASAT satellite. Hams use their satellites by transmitting signals up to OSCAR, which retransmits the signals back to Earth.

Satellites built by hams

OSCAR satellites have been built by hams from many countries. For instance, the 65-pound OSCAR 7 includes a telemetry system built by



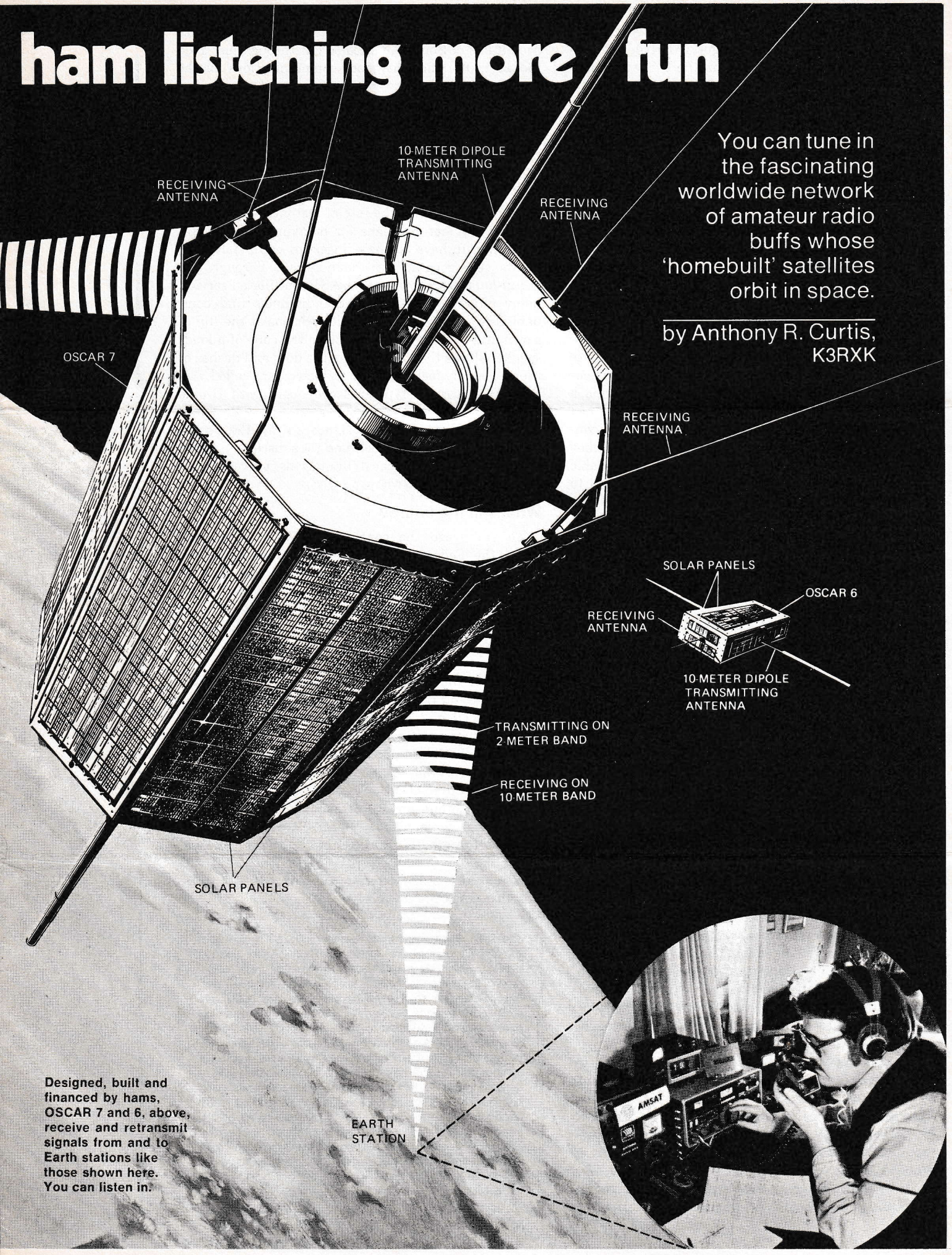
Orbit-bound is an OSCAR riding as piggyback ballast on a Delta rocket.


Range doubling to 5000 miles is possible when OSCAR flies through overlapping range rings.
WORKING AREA
2450 MILES
2450 MILES

ham listening more fun

You can tune in the fascinating worldwide network of amateur radio buffs whose 'homebuilt' satellites orbit in space.

by Anthony R. Curtis, K3RXK



Designed, built and financed by hams, OSCAR 7 and 6, above, receive and retransmit signals from and to Earth stations like those shown here. You can listen in.

Australian hams, one retransmitting system built by German hams, another rebroadcaster built by Americans, a beacon transmitter built by Canadian hams and another beacon built by a San Bernardino, Calif., ham club. New and even more sophisticated amateur satellites are under construction.

OSCAR fever hit me hard. Sputnik, Pioneer, Vanguard, Explorer, Apollo —18 years of space satellites in the news made me dream of getting into the space age. When amateur satellites made space communications possible for the man-on-the-street, I had to be in on the action. Thousands of other hams had the same gut reaction.

Anybody can listen

First, I wanted to hear the Morse-code telemetry beacon from the satellites. Then I wanted to be able to transmit through the satellites to other hams and shortwave listeners. I had a shortwave receiver just like any shortwave radio listener's. The radio was capable of being tuned to the amateur radio 10-meter band. Both OSCARs transmit down to Earth on frequencies between 29.400-29.550 MHz. Most popular general-coverage shortwave radios cover 550 KHz to 30 MHz which spans the OSCAR downlink frequencies. Anybody with one of these receivers can sit at home and listen to OSCAR.

Amateur radio operators transmit up to OSCAR on frequencies in the two-meter ham band. OSCAR repeats what it hears by retransmitting down in the 10-meter ham band. It is only necessary to listen in on 10 meters to hear everything going through OSCAR. Signals passing through OSCAR are in voice and in Morse code. Many conversations go on at the same time.

Since the satellites are at altitudes of 900 miles, an Earth station can be up to 2450 miles away from an OSCAR and receive signals from it when it comes over the horizon. Communication is possible with another ham up to 4900 miles away when the satellite is in view of his station at the same time. The satellite is constantly moving along its orbital path so stations in different parts of the world come in and go out of view of the satellite. A very large portion of the globe is available for communication for the ham operator who waits for OSCAR to be in just the right spot. It's amazing too that this coverage is possible with rigs that are small in size, power and cost.

Simple antennas

Fancy equipment is not needed to hear OSCAR. All I use is the shortwave receiver and a wire antenna strung between two chimneys on my house. My antenna is a simple dipole constructed with 8 feet of wire attached to each end of a center insulator. The lead-in attaches to each "branch" at the center insulator.

Bob Peters, operator of amateur radio station K3EZS in State College, Pa., listens to OSCAR with a 25-year-old shortwave radio and a single long-wire antenna running from his ham shack out to a tree.

Once in a while a radio will sound dead on 10 meters and need some extra pep. To give their radios a boost, hams add small preamplifiers between antenna and receiver. They are available from radio stores in kits for $6 or ready-made for $12. Adding such a preamp would give a basic OSCAR Earth-station Cadillac quality. A preamp usually is not needed to hear the stronger signals passing through OSCAR.

One feature needed in the receiver is a "BFO" (beat frequency oscillator) or other means of detecting single sideband (SSB) voice communications and the beep-beep of Morse code. OSCAR can hear and retransmit AM, FM, SSB and code. But AM and FM transmissions suck too much current from OSCAR's batteries. So SSB and code are the hams' favorite modes of operation.

Here comes OSCAR

It was exciting when I first fired up my own Earth station. The 10-meter band was silent as the satellite crossed the equator and moved north toward the United States. Suddenly, as the satellite came over my horizon some 2450 miles southwest of my station, the band came alive with signals. There was the Morse-code telemetry beacon on 29.502 MHz. Morse code and SSB voice conversations were everywhere between 29.400-29.500 MHz. OSCAR 7 was out over the Rocky Mountains streaking north at four miles per second.

I knew my signal should be in the area of 29.480 MHz so I tuned there and transmitted a long string of "dits," the letter "E" in the dit-dah of Morse code. And there it was. My own dits coming back to me from 900 miles above the Rocky Mountains. Quickly I sent a simple "CQ de K3RXK," meaning, "Hey, you guys, how about somebody talking to me.'" Immediately Gordy Wightman, operator of ham station VE5XU who had been listening by coincidence on my frequency, came right back to me, "K3RXK de VE5XU." I got goose-bumps from the excitement.

Here I was. A licensed ham for 21 years. Eighteen years after Sputnik. I was freely using an orbiting satellite floating across the sky out west more than 1000 miles from my central Pennsylvania home, working another fellow all the way up in Regina, Sask.!

Gordy and I talked for about five minutes, exchanging signal reports while the satellite raced 1200 miles farther north. OSCAR 7 was in view of my Earth station only 20 minutes on that pass. Listening for the satellite and for my own signals, and talking to Gordy, I used up the time.

Next evening, OSCAR 7 came over again and Ed Bizub, WA2CBB of Clark, N.J., came back to my call. And yet another thrill was coming. My first "DX" distance contact came on the third night. OSCAR 7 was over the North Atlantic when G3IOR in Norfolk, England, came back to my CQ. Again the rush of excitement was overwhelming.

My first use of OSCAR 6 came shortly after I talked with G3IOR. OSCARs 6 and 7 are in similar orbits, one trailing the other. After a satellite crosses the equator, it passes over the United States from south to north.

The Earth is moving under the satellite so OSCAR seems to be moving to the west. If the satellite comes up over the Southeastern United States one hour, it will come northward over the Rocky Mountains two hours later. And two hours after that it will come north over the Pacific Coast. And so on, around the Earth in a corkscrew pattern, daily covering the United States and the world.

Because of the spinning Earth, a satellite half the time ends up looping across the equator south-to-north

on the far side of the globe. When this happens, OSCAR comes up over top of the North Pole and down over the United States from north to south. A new orbit starts whenever and wherever OSCAR passes across the equator south-to-north.

Talk to each other

Since OSCARs 6 and 7 are in slightly different orbits, they are not overhead at the same time. The distance apart varies. Twice a year they are so close hams can talk to each other through both at the same time. A signal goes up to OSCAR 7 and is retransmitted to OSCAR 6 which retransmits the signal to Earth.

A half-hour after I chatted with G3IOR in England, OSCAR 6 came over my horizon. My first contact through that satellite was with Dick Smith, W1FTX of Winsted, Conn.

Contacts through both satellites in the weeks following were with amateurs in California, Florida, Illinois, Kansas, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, Texas, Virginia, Wisconsin and Washington. Hams are on in all states and everybody has an equal chance to hear the satellite.

Like OSCAR 7 signals from OSCAR 6 come down on the 10-meter band at frequencies between 29.450-29.550 MHz. Its beacon is at 29.450 MHz. Telemetry beacons from the satellites are strings of numbers in Morse code that can be deciphered easily to find out temperatures, voltages and current drain in the satellites. OSCAR has an alarm clock on board to remind when internal housekeeping chores are to be done. It's easy to find out what time OSCAR thinks it is from the telemetry.

Emergency communications

The satellites are being tested in several serious experiments. Medical electrocardiograms (EKGs) have been sent via OSCAR 7 from George Dillon, W6ELT at Santa Ana, Calif., to Len Aberbach, K3ATA, at the National Institutes of Health in Washington, D.C.

Miami hams maintain a hurricane watch and weather bulletins are transmitted via satellites. Techniques are being worked out to use the satellites to find downed aircraft. Portable Earth stations in suitcases are being built to provide emergency communications at earthquake and other natural-disaster sites on short notice anywhere on the globe.

The American Radio Relay League (ARRL), national organization of radio amateurs, makes available free to interested teachers a curriculum book for classroom use of OSCAR in teaching math, physics, astronomy, communications, electronics and space science. The book explains in elementary language how to use a simple shortwave receiver to teach and learn what keeps a satellite up, what governs its speed and how to use OSCAR for many math and science classroom activities. Hundreds of school students already have participated in the program.

Students using the educational package learn how to determine the satellite's period, how long it takes to go once around the globe; its increment, how many degrees farther west it will be when it crosses the equator next time; and its inclination, the angle at which the satellite path crosses the equator.

OSCAR 6 has a period of 114.99449 minutes, an increment of 28.7486° per orbit, and an inclination of 101.6015°. OSCAR 7 has a period of 114.94478 minutes, an increment of 28.7362° per orbit, and an inclination of 101.7010°.

For more information about the educational program write the ARRL at 225 Main St., Newington, Conn. 06111. For more about when, where and how to listen to OSCAR, write the Radio Amateur Satellite Corp. (AMSAT), Box 27, Washington, D.C. 20044. AMSAT is an international organization of hams and listeners interested in amateur satellite work. It sponsors the satellites and coordinates activities.

OSCAR Earth stations need not be in houses. Fred Merry, W2GN of East Greenbush, N.Y., makes contacts through OSCAR while driving his car. Dick Long, WA4JID of Plantation, Fla., talked with hams from on board his sailboat while on an ocean trip down through the Florida Keys.

Sun-revitalized batteries

OSCARs are powered by rechargeable nickel-cadmium (nicad) batteries, revitalized by the sun through solar cells on the satellite skins. OSCAR 7 has many more cells so its power supply is stronger. OSCAR 6, with fewer solar cells, is turned off periodically to conserve energy.

OSCAR 6 has only one rebroadcaster on board. It is only capable of hearing signals in the two-meter ham band and retransmitting them on the 10-meter amateur band. OSCAR 7, on the other hand, has two repeaters aboard. One day it hears the two-meter band and retransmits on 10 meters. The next day it hears signals

Do I need a license?

Federal regulations require a license to operate any radio transmitter in the United States (except, of course, toy type, low power, walkie-talkies). Most hams begin with a Novice license. To get yours, you must pass a test to demonstrate your ability to understand Morse code, and must know the simple, basic amateur radio rules and regulations as well as the most elementary radio theory needed to operate a radio.

Is it difficult to get a Novice license?

By no means. Many elementary school students have had no trouble obtaining Novice licenses. Men and women from 8 to 80 are joining the fast growing ranks of amateur radio operators each month. If they can do it, you can do it. Neither the code or the theory is a real obstacle. All you need is the interest and desire, and a few weeks of study.

What if I need more help?

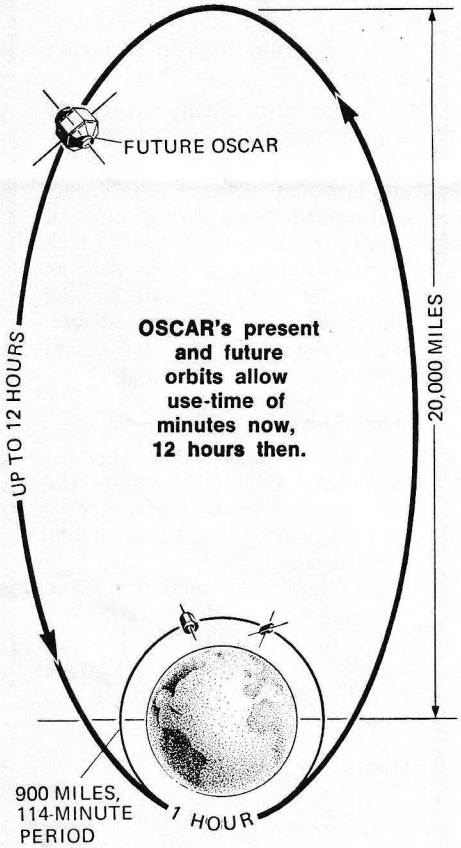
There are hundreds of amateur radio clubs located throughout the country that offer Novice license training classes on regular basis. Most amateurs are more than willing to help newcomers join in on the fun and excitement of ham radio. If you have trouble locating a club or amateur to help you get your license, contact the ARRL in Newington, Connecticut.

What is the ARRL?

ARRL stands for the American Radio Relay League, which is an organization of more than 125,000 radio amateurs dedicated to the interests of ham radio. Among its activities is the publication of an extensive library of books ranging from the introductory *Tune in the World* to *Radio Amateur's Handbook*, the information book of amateur radio. Another major activity is the publication of *QST*, the monthly journal of the ARRL. In the pages of *QST* you'll find articles of interest to the new Novice as well as the experienced amateur. The ARRL also provides daily on-the-air code practice, free technical assistance to members, help with licensing, and much more.

American Radio Relay League
225 Main Street
Newington, CT 06111

A typical Earth station will use relatively low-powered rigs to talk through OSCAR.


FUTURE OSCAR
OSCAR's present and future orbits allow use-time of minutes now, 12 hours then.
UP TO 12 HOURS
20,000 MILES
900 MILES, 114-MINUTE PERIOD
1 HOUR

OSCAR HISTORY

Amateur radio will mark its 15th anniversary in space this year. It was 12:42 p.m. on Dec. 12, 1961, when a Thor-Agena rocket lifted on a pillar of flame from Vandenberg, Calif., carrying a 10-pound OSCAR satellite aboard as ballast.

Working evenings, weekends and during every spare moment in basements, garages and attics, hams have built seven OSCARS. Here's a rundown:

OSCAR 1 carried a transmitter with power of only one-tenth of a watt which transmitted telemetry in a beacon to Earth for three weeks.

OSCAR 2, launched June 2, 1962, was identical to OSCAR 1 with telemetry-beacon transmissions lasting 18 days.

OSCAR 3, launched March 9, 1965, was amateur radio's first active communications satellite. It received ham signals and retransmitted them at the high output power of one watt. It made history as the first free-access communications satellite. One hundred different amateur stations in 16 countries communicated through the satellite during its two-week life.

OSCAR 4, launched Dec. 21, 1965, was an active satellite with three watts output. It did not make a good orbit, but hams did communicate through it, including the first direct U.S.-to-U.S.S.R. contact via satellite.

OSCAR 5, launched Jan. 23, 1970, was built by students at Melbourne University, Australia, and launched from the United States under auspices of the AMSAT. Its batteries lasted 1½ months.

OSCAR 6, launched Oct. 15, 1972, is still going strong as an active repeater satellite. It hears ham signals and retransmits them. The 40-pound satellite can store messages and repeat them. It can be turned on or off by ground command. Transmitter power is one watt.

OSCAR 7, launched Nov. 15, 1974, was built by hams in Germany, Canada, Australia and the United States. It has two separate communications repeaters on board with two watts power. It can store messages for later replay, be turned on or off at ground command. Medical data, weather bulletins and other emergency communications have been transmitted through the 65-pound OSCAR 7.

at 432 MHz in the 70-centimeter band, and retransmits them to Earth in the two-meter band. Shortwave receivers hear only the 10-meter band, not two meters, so OSCAR 7 can be heard with a simple receiver only every other day. OSCAR 7 signals on alternate days coming down on two meters can be heard by hooking a converter between antenna and receiver. Converters start at $40.

When to listen

A sure-fire way to hear OSCAR is to turn on a shortwave receiver any night except Tuesday. OSCARs pass overhead at least twice during an evening. OSCAR 6 will be turned on for hams to communicate through on Sunday, Wednesday and Friday night local time in the United States. OSCAR 7 will transmit on 10 meters on odd-numbered days of the year.

A pass over eastern North America will take place between 7:00 and 9:00 p.m. Eastern Standard Time. A pass over western North America will take place between 9:00 and 11:00 p.m. EST (6:00 to 8:00 p.m. PST).

Select the band on the receiver for coverage of the 10-meter ham band. Set the dial at about 29.5 MHz. Turn on the receiver's "BFO" or turn a "mode" switch to "CW" or "code" or "SSB" position. When an OSCAR satellite passes overhead or near your location you'll be able to hear at least the stronger signals coming through.

OSCAR 6 was designed for one year of life. However, last fall hams around the world celebrated its third birthday. OSCAR 7 also will be in orbit for years. And AMSAT is building a new generation of OSCARs to extend communications time to hours. They will have kick motors to push the satellites into elliptical orbits taking OSCAR as far out as 20,000 miles over the Northern Hemisphere. These satellites will be in view of Northern Hemisphere Earth stations up to 12 hours and out of sight behind the Earth only about one hour. The ability of hams to help out in emergencies and natural disasters, transmit medical data or locate downed aircraft will be even greater.

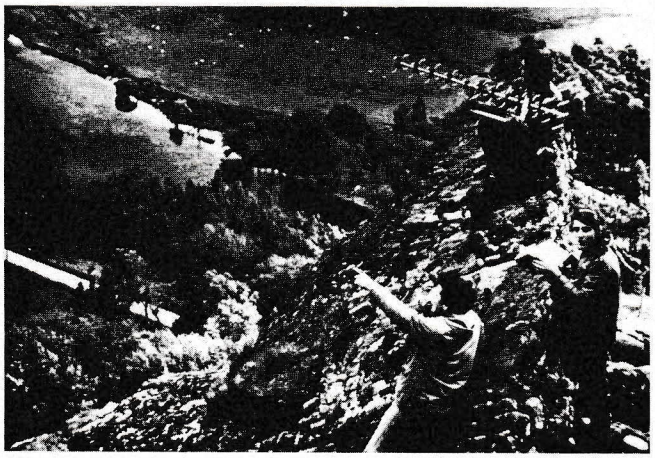
So dust off your shortwave receiver. Hang out a wire antenna. Cock an ear toward OSCAR. You might hear WA4JID on the ocean, W2GN in his car, EKGs from California, hurricane bulletins from Florida, G3IOR completing an extraordinary 6000-mile conversation with W6CG, or even my station, K3RXK, as I talk with new states and countries. There's plenty of excitement when you ride along with the ham satellites. ★★★

Inside amateur radio

Devoted to public service transcending geographical and political boundaries, today's ham is not a mere tinkerer

An off-duty taxicab driver points his antenna in a predetermined direction, carefully tunes his receiver around an expected frequency, and picks up satellite tracking beacons. A student—a grade-schooler—flicks a switch and she and her classmates are greeted from outer space. A mother paces back and forth in the corridor of a Colombian hospital while her daughter lies unconscious in an intensive-care unit. Thousands of miles away in Cincinnati, Ohio, an amateur radio operator picks up a medical emergency: a Colombian child will die without drugs only two hospitals—one in Chicago, the other in California—can provide. A few phone calls and the drugs are on their way to Bogota.

Amateur, or "ham," radio has come a long way from the early days of often idle chatter between radio pen pals. Its purposes can be profound and its technology can be sophisticated. Solid-state transistors have replaced audions. Synchronous spark gaps are no longer rotated by the motor of mom's Maytag washer. But hams—the last of the great tinkerers in an age when industrial team research has made of the individual experimentor an endangered species—keep fiddling and transmitting. And with the advent of satellites exclusively for hams, amateur radio has entered the space age. At the fingertips of every amateur radio operator are the satisfactions that can be had from international camaraderie, public service, and education—both cultural and scientific.



Although this picturesque setting is in Scotland, hams throughout the world do it—make field calibrations, that is!

Ragchewers, International

One of the great joys of the amateur radio operator has always been "chewing the rag" with hams far removed from home base. "Ragchewing" is radio jargon for the kind of chatter that can result in friendships that know no boundary—be it geographical, cultural, economic, or even political.

Through a language of international recognized *Q* signals, routine exchanges can be made in code without extensive knowledge of another language. And with the current widespread use of English, relaxed chats on single-sideband (SSB) voice communications with hams in locations as diverse as the Ukraine, Japan, or Sikkim are not unusual. Dialogue usually includes all manner of shop talk—from modes and equipment to propagation conditions. In the end, these interactions often provide a catalyst for synergistic accomplishment, resulting in such positive results as a new antenna design, a keyer, or even a personal friendship.

December 12, 1961, was a monumental day in the history of amateur radio—one that saw the addition of a new dimension to the hobby. On that Tuesday, a Thor–Agena rocket surged from its launch pad carrying the world's first nongovernmental, noncommercial satellite—called Oscar, for "orbiting satellite carrying amateur radio." Designed and built by radio amateurs themselves, the ten-pound "homemade" satellite transmitted the greating "hi" in Morse code to radio hams on all continents during its trips around the world.

A succession of ham satellites have followed. Oscar-6 was launched by the National Aeronautics and Space Administration in October 1972 and, at last report, it was still being used by some 2400 radio amateurs in 87 countries and all 50 states of the U.S. Late last year, NASA launched Oscar-7, the most complicated in the series and the culmination of a four-year Radio Amateur Satellite Corporation (AMSAT) project, which will not only be able to talk to children in classrooms, but to transmit hurricane warnings, relay important medical information to isolated areas, and provide other emergency communications functions.

Ham and education

Some of the most vital of today's novel applications of amateur radio are in the educational sphere. This is true at far more sophisticated levels than the elementary school project mentioned at the outset. In one recent instance, a university research scientist beamed radio signals to bounce off an Oscar satellite orbiting 1000 miles above the earth. The purpose was to gather fundamental data about the propagation of radio waves through the upper atmosphere.

In the classroom, students, at all levels, are gaining hands-on experience in space science through an Oscar

Judith C. Gorski *QST*

educational program developed jointly by NASA and the American Radio Relay League (ARRL), the predominant amateur organization in the U.S. and Canada. Using inexpensive terminals to receive Oscar data, students find themselves immersed in a total sensory learning experience—listening for radio signals, manipulating equipment, and applying data collected firsthand to standard textbook formulas. They participate physically and emotionally, as well as intellectually, in what would otherwise seem abstract, even esoteric, topics.

Such pioneering pilot programs have been undertaken with good results at the Talcott Mountain Science Center in Avon, Conn., as well as in schools throughout the U.S. With educators at the Talcott center, the ARRL has prepared a comprehensive curriculum-supplement guide available to teachers. As headquarters, the Newington center acts as liaison between teachers and nearby area radio ham operators who are able to provide both the equipment and the expertise for demonstrations. Testifying to the success of the program, a Boston teacher reported: "Most of my students had never seen a communications receiver and had no conception of radio communications outside of what they had seen on television. The idea of actually being able to hear a satellite transmit, to plot its course, and to interpret the telemetry was sufficient to motivate the students to learn more."

Public service

• Driving on a slick road late one rainy evening, a mobile operator in Michigan spotted a car down an embankment with the driver slumped over the wheel. He alerted the police, who promptly arrived at the scene with emergency first-aid.

• A tornado raked an Arkansas town, resulting in fatalities, injuries, and extensive property damage. Although commercial communication lines went down, amateur nets relayed emergency traffic for the Red Cross.

As these stories indicate, service for the public good is another facet of ham radio's many dimensions. The log of communications handled in emergency situations by ham operators each year is impressively long. From routine aid to stranded motorists to the dramatic rescue of life during natural disasters, the amateur operator can, and often does, function in the role of a liaison for transferring essential information from one source to another.

To meet the heavy pressures generated by crisis situations, amateur radio clubs schedule mock emergency and training sessions to enable hams to operate under rigorous conditions, thus ensuring the smooth operation of existing traffic nets in time of crisis. In addition, field-day contests sponsored by the ARRL encourage operators to maintain portable, battery-powered equipment in peak running condition.

One extremely helpful public service performed by hams is that of *phone patching,* in which the operator by means of special equipment transmits the voice message of someone isolated in a remote area back to his home country, where the recipient hears it over normal telephone lines. This technique is used only in cases where no access to commercial telephone lines exists between two areas. Ham stations often accompany medical, missionary, or scientific expeditions to such remote areas as the Antarctic or the Andes Mountains of South America to put through just such morale traffic and emergency communications for the expedition members.

Yet, with the tremendous volume of emergency and morale-building traffic relayed by the amateur ham, one of his most significant contributions to public welfare spins off as still another dimension of the art. To be physically confined to a wheelchair in the silence of deafness and the darkness of blindness can be a lonely existence; yet such is the fate of many throughout the world. What better means for breaking these limitations than to have at one's fingertips equipment that knows few geographical boundaries? Through the *handi-ham* program, another ARRL-affiliated service, many physically handicapped individuals find companionship and vast geographic horizons at the flip of a switch. Placing the fingers inside the cone of a loudspeaker allows the deaf to copy the dots and dashes of Morse code by feel. Utilizing an instrument called Tellatouch—a sort of typewriter keyboard with Braille characters—allows the sightless to transmit. Club-sponsored programs are designed to aid the handicapped in obtaining licenses and thus discover a medium in which no physical limitations prevent their meeting people everywhere.

What's in the future?

To encourage the continued growth of amateur radio, the Federal Communications Commission recently issued Docket 20282, a proposal that aims at providing a broader licensing structure with a dual-ladder approach. After an extensive opinion survey of its 100 000 membership, ARRL filed a counterproposal that it feels represents the best interests of amateur radio.

In 1979, the General World Administrative Radio Conference of the International Telecommunication Union (ITU) will examine all existing international radio regulations affecting all services, including amateur radio. The all-important table of frequency allocations, which establishes ham bandwidths, will especially be subject to revision.

The health and fortune of ham radio, then, revolve around these major events. Whether amateur radio can continue to be both a fun pastime fulfilling the creative needs of its participants, and a viable national communications and educational resource, is a question that only time can answer. ◆

Judith C. Gorski is a staff member of *QST,* the official monthly journal of the American Radio Relay League (ARRL), which, as mentioned in the text, is the principal ham organization in the U.S. and Canada. Although perhaps unfamiliar to many *Spectrum* readers, *QST* has been around since December 1915, when it was first published and distributed at 10 cents a copy. The magazine serves as a rostrum for technical expertise, as a forum for ARRL member opinions and news, and as a synthesizer for the ham fraternity. Companion publications of the ARRL include a flock of how-to manuals and handbooks for beginners as well as experts. And ARRL headquarters at Newington, Conn., serves hams by answering difficult questions, testing products in its own laboratory, and providing summer apprenticeship training, local area courses to assist prospective hams to obtain their licenses, and instructional films and related materials.